South Atlantic Bight Synoptic Offshore Observational Network

Charlie Barans
Marine Resources Division
South Carolina Department of Natural Resources
P.O. Box 12559
Charleston, SC 29422
phone: (843) 762-5084 fax: (843) 762-5110 email: baransc@mrd.dnr.state.sc.us
Award #: N000149810808

LONG-TERM GOAL

The long term goal is to evaluate underwater television for providing fishery managers real-time visual data on reef fish communities which will contribute to making and/ or modifying fishery management regulations.

OBJECTIVES

There are several objectives which will be integrated with the oceanographic observations of the overall SABSOON project and include: 1) identification of environmental conditions associated with the formation of prespawning aggregations of gag grouper, 2) determination of temporal changes in visual indices of abundance of fish species for which no commercial harvest is allowed, and 3) correlation of resuspended bottom sediments to fish community structure. The scientific objectives will require successful development of a reliable underwater TV system which can provide near full motion video for long periods of time.

APPROACH

We have established an underwater TV research site and associated reef fish community (Fig. 1) approximately 45 miles off the coast of Georgia. Transmission of digital image data is from a bottom mounted camera system (Fig 2), through a network at the Skidaway Institute of Oceanography (SkIO), and to our laboratory in Charleston, SC via an established USN (Tactical Air Combat Training System) microwave linkage to shore. Deployment and maintenance have been with the assistance from the Director and dive crews of the Gray's Reef National Marine Sanctuary. Observations and counts of the fish populations will be conducted daily and correlated with subsurface oceanographic conditions and surface winds measured by collaborators at SkIO.

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
30 SEP 1999		**00-00-1999 to 00-00-1999**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
South Atlantic Bight Synoptic Offshore Observational Network	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **South Carolina Department of Natural Resources,Marine Resources Division,P.O. Box 12559,Charleston,SC,29422**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

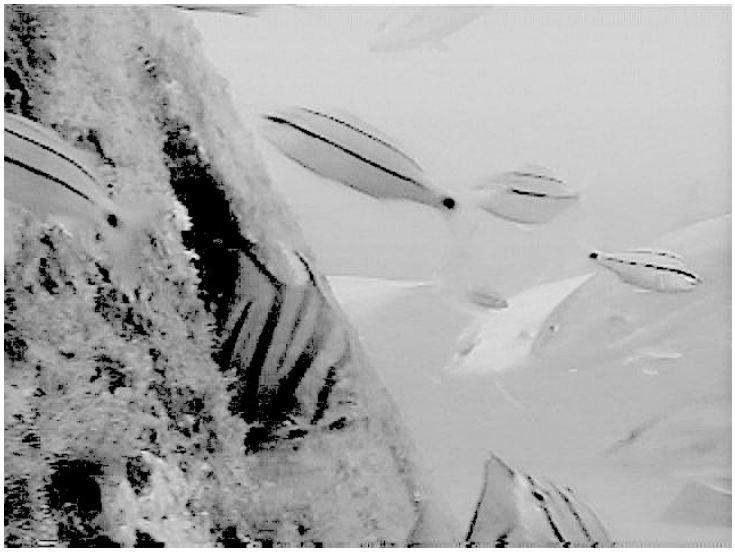
13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**4**	

1.Underwater TV camera system on one of the fish attraction structures.



2. Fish community associated with the artificial reef structures at the research site.

WORK COMPLETED

The research site was established in 25-28 m of water off central Georgia on May 11, 1999 with the deployment of 18 large fish attraction units. On August 24, the underwater TV cameras, cable and the computer were installed and confirmed to be functioning correctly.

The TV system is composed of six monochrome video cameras housed with a microcontroller and a few basic sensors. The microcontroller provides the means to multiplex the 6 analog video signal (NTSC RS-170), from each camera, to the one coaxial cable running between the pressure housing and

the video capture engine. The microcontroller also provides the interface to a video titler and sensors. The coaxial cable along with power and communications conductors extends from the sea floor to the video capture engine, which is an embedded computer running under the Windows NT operating system. A console application controls a video frame grabber which takes the analog video signal and converts it to digital images. The system has the ability to capture multi-frame or single frame images based on parameters set by the user. The microcontroller, in the pressure housing, receives commands from the video capture engine for camera selection, titling data, and system status updating. The video system is controlled through the embedded computer as a web server. File transfer and system parameter updates are made by an interface between the web server and the console application controlling the video system.

With the preliminary system components and communication linkages in place off the coast of Georgia, still images and brief video are being retrieved from recorded files. The system of cameras, cables and computers are submerged in or in close proximity to salt water and, therefore, represent a high maintenance system. In addition, the communication linkage requires rerouting, upgrading and modifications to ensure increased efficiency and increased access to visible data. We remain a long way from our ultimate goal of full motion video and easy public access through development of a web site.

RESULTS

We have learned how to deploy and maintain the underwater TV system and remote operation systems prior to gathering extensive research data. An accumulative fish species list has been initiated. Dates of first observation or presence of fish species are especially important for identification of any prespawning migration to the south by adult gag grouper.

The scientific objectives of the observational research are dependent on reliability of the system, visibility within the water column, and establishment of a near camera fish community. The camera system has been relatively dependable through several meteorological events (hurricanes Dennis and Floyd), although high winds and seas do reduce visibility and may obscure the field of view with resuspended fine bottom materials for several days. The fisheries research data can easily be gathered during brief daily counts of fish present near the cameras. Although the species recognition of large commercially and recreationally important species is dependent on the resolution of the cameras, identifications have been relatively easy to date. Large schools of bait fish have been present on most days accompanied by schools of predatory amber jacks. The subjects of our interest, snapper and grouper species, have yet to establish resident or transient populations at the site. Our observations will continue.

The most pressing underwater system needs at the time of this report are to: level the camera support bent over during hurricane Floyd, streamline network systems to allow reliable and easy access to images, and rearrange the fish attraction structures around the multi-camera unit to ensure that all cameras have good fish habitat within view. This last will require a well coordinated cruise of divers and a period of near perfect weather. Continual upgrading of the transmission and communication network will be required until we achieve unrestricted access to the camera images, while working toward near real-time, full motion video capabilities.

IMPACT/APPLICATION

The fishery management information from visual observation data will be accumulating over time. An example of useful data would be temporal changes in the relative abundance (counts) of the red porgy, Pagrus pagrus. The red porgy was once the most important commercially landed species in the South Atlantic Bight region. At present, population levels are so low from overfishing, that a complete moratorium on fishing for this species has been suggested by the South Atlantic Fishery Management Council. There is a good probability that a fishery closure will be in place for up to 18 years. During that or a similar period, traditional fisheries data from any illegal harvest will be unavailable, therefore any improvement in the population size in response to the fishery regulations in place would have to come from fishery independent counts/estimates, such as non-harvest TV observations.

Previously, in the 1980's, large gag groupers would aggregate in November or December each year at the Savannah light which has since been destroyed. The present configuration of the camera system should be able to determine the presence or absence of grouper aggregations at the TV site. Any information on the timing and spatial extent of a grouper aggregation, especially if the fish were in prespawning condition, could contribute significantly to the management of this declining species.

An undescribed relationship between a local snapper-grouper community and the near-bottom sediment/turbidity levels may exist at mid-shelf locations such as the TV camera site. Any statistically significant relationship should be easily determined by correlating fish counts and species diversity with light and visibility levels measured or estimated at the cameras.

TRANSITIONS

Estimates of water visibility offshore from recent images have been used by Gray's Reef Sanctuary and SC DNR divers in planning offshore research efforts. Use of the visual fish community information by management agencies and the general public will increase greatly when access to the images is readily available.

RELATED PROJECTS

Fishery biologists have been investigating the relationships between environmental conditions and fish populations for many years. Other projects of the South Atlantic Bight Synoptic Offshore Observational Network (SkIO) are focused on the meteorological and in situ oceanographic conditions near the UWTV research site; there resulting data will be integrated into our understanding of fish community dynamics. Also, SC DNR fishery scientists are conducting research on fish communities of artificial reef that are not fished to evaluate the establishment of Marine Fisheries Reserves as a fishery management tool. The UWTV system will provide a long temporal data series on fish abundance and behavior that will not be influenced by either the presence of divers or by removal sampling techniques.